April 2011

Energy Services BULLETIN

Western's monthly energy efficiency and renewable energy newsletter dedicated to customer activities and sharing information on energy services.

Home efficiency program earns Burbank Water and Power savings, accolades

Burbank Water and Power (BWP) has won the California Municipal Utilities Association (CMUA) 2011 Public Benefits Award for a small utility.

The confederation of 61 locally-owned utilities across California annually honors the best and brightest of its members in different categories. The Public Benefits category looks for innovative and comprehensive approaches in implementing energy efficiency, renewable energy portfolio standards, research and development in the energy field, greenhouse gas reduction strategies or low income assistance efforts.

BWP's "Green Home House Call" program beat out competitors with its delivery of energy- and water-saving products and services at no cost to single-family and multi-family Burbank residences. Introduced in November 2009, the program provides inspections and upgrades for:

- *Attic insulation:* Attic insulation levels are reviewed in homes with central air conditioning. When below a specified R-value, the homeowner receives free insulation.
- *Duct testing and sealing:* Homes receiving attic insulation also receive duct testing and sealing services to prevent the heated or cooled air from seeping out of the home's air delivery system.
- *Irrigation system inspection and programming:* To address the need for landscape water conservation, BWP includes irrigation system inspection and landscape sprinkler-controller programming as part of the Green Home House Call program. Controllers are programmed to comply with the City of Burbank's three-day-per-week landscape watering ordinance. Inspectors turn on the irrigation system and inspect it, and adjust sprinkler heads for over-spray or misdirection.
- *Toilets:* The Green Home House Call features a test of toilet flappers to insure no leaks are present; flappers are replaced as needed through the program.
- *Compact fluorescent lights (CFLs):* Up to 10 of these high-efficiency light bulbs are installed at each home. CFLs use one-fourth the energy of incandescent light bulbs.

The Green Home House Call specialists perform simple tests such as checking the temperature of hot water coming from faucets, and show homeowners how easy measures like turning down their hot water heaters can add up to big savings. (Photo by Burbank Power and Water)

- *Indoor water savings:* Low-flow showerheads and kitchen and bathroom faucet aerators are installed for the resident for permanent water savings.
- *Pool pumps:* In homes with pools, the Green Home House Call professional checks the condition of the pool pump and the programmed hours of operation.
- *Hot water:* The water temperature of faucets is checked and residents are shown how to adjust the water heater thermostat as needed.

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What's inside

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- *Refrigerator temperature:* The program professional checks refrigerator and freezer temperatures and shows how to adjust the thermostat as needed.
- *Customized report:* Each customer receives a customized report detailing the work that took place and any recommendations that were made. Information on BWP and Southern California Gas Company rebates and services is also provided.

Whole house approach

"We went for the comprehensive, 'whole-house' approach to achieve the greatest energy and water savings," explained Program Manager Joe Flores.

That was the reason for adding the attic insulation element and duct-testing service to the program, Flores continued. Those are two measures that can save so much energy, but homeowners rarely think of doing them first. "It's a case of 'out-of-sight, out-of-mind,' but attic insulation and duct sealing offer a big bang for the buck," he said.

Energy Services Bulletin

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The "whole house" approach meant addressing water use as well as power, which posed something of a challenge when BWP was developing the Green Home House Call. Program models from other utilities that focused only on electricity would leave out natural gas customers in BWP's territory, and ignore critical water savings entirely. By partnering with the Southern California Gas Company and adding indoor and outdoor water measures, BWP designed a program that could deliver savings for all its residents. "Water conservation is so important in Southern California, residents really appreciate that our inspectors look for landscape watering issues for them," Flores said.

Contractors needed

Finding workers to provide all the different products and services under the Green Home House Call umbrella was another challenge. The program has too many elements—and requires too much manpower—for a small municipal utility to handle in-house. "It was definitely necessary to create a pool of outside contractors for the program," Flores admitted.

To perform the inspections, BWP selected a primary contractor by competitive bid through the Southern California Public Power Authority. This contractor provides consumer education and customized reports, and installs the minor measures including CFLs, shower heads, toilet leak repair and landscape controller programming. A secondary contractor does the specialized jobs of attic insulation and venting and duct sealing.

Getting the word out

All Burbank residents are eligible to take advantage of the Green Home House Call program at no out-of-pocket cost to participate. "The most frequent comment we receive about Green Home House Calls is that it is too good to be true," said Flores. "Our biggest challenge with the program is convincing Burbank residents that there truly is no catch."

To overcome that disbelief, "We promote the heck out of Green Home House Call!" said BWP Marketing Manager Jeanette Meyer.

BWP puts information about the program into its quarterly newsletter, in the monthly City newsletters that go out with the bills and on the bills themselves. "We send out fliers to targeted zip codes, talk about the program at events and feature it on our website," she said. "Our mayor videotaped a public service announcement about the program that runs frequently on the city's government access cable channel. That's reached a surprising number of people."

Results say it all

To date, over 1,700 Burbank households have received Green Home House Calls. Through the program, BWP has installed more than 450,000 square feet of attic insulation, more than 4,500 compact fluorescent light bulbs, about 1,300 low-flow showerheads, and adjusted more than 1,000 sprinkler and landscape timers. These results are producing an estimated annual water savings of over 60 million gallons and more than 1 million kilowatt-hours of electricity savings. These savings are enough to power more than 175 Burbank homes for a full year and

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Wind award recognizes Minnkota Power Cooperative's leadership

A utility can promote wind power by developing turbines or by developing the market for clean energy—or by doing both, as the recipient of the 2010 Wind Cooperative of the Year Award did.

Grand Forks, N.D.-based Minnkota Power Cooperative earned the recognition not only for developing North Dakota's first utility-owned wind turbines, but also for its significant purchases of power from other facilities. A panel of renewable energy and utility experts selected the Grand Forks, N.D.-based generation and transmission (G&T) cooperative from eight nominees.

Western Renewable Energy Program Manager Randy Manion presented the award at the National Rural Electric Cooperative Association (NRECA) TechAdvantage Conference in Orlando, Fla., March 10. NRECA and DOE's Wind Powering America initiative annually honor an NRECA member that has shown exceptional leadership and creativity in developing and supporting wind energy. "Western is proud to partner with NRECA and DOE Wind Technologies program through Wind Powering America to work toward removing barriers to more wind development," said Manion. "The award is one way we can encourage cooperatives that are showing new ways to overcome those barriers."

The Langdon II Wind Farm supplies Minnkota Power Cooperative with 99 MW of clean energy. Combined with other wind power purchases, Minnkota can meet 30 percent of its customers' electricity needs with renewable energy. (Photo by Minnkota Power Cooperative)

First in North Dakota

Since its inception 10 years ago, the award has gone to many electric cooperatives for their part in developing new wind facilities. For Minnkota, installing the 900-kW Infinity I turbine in Valley City, N.D. in 2002 was really just the beginning.

Just as there is more than one way to support wind power, there is more than one reason to do it. A customer survey several years earlier indicated that ratepayers in Minnekota's territory had a strong interest in renewable energy. At about the same time, the state of Minnesota passed a bill that required utilities serving loads within the state to offer consumers a green power option. Minnkota, which serves cooperatives in eastern North Dakota and western Minnesota, developed North Dakota's first utility-owned wind turbine to help its members meet the new requirement.

That first turbine supplied the power for the Infinity Wind Energy program for customers of systems associated with Minnkota and the Northern Municipal Power Agency. To date, the program has more than 2,000 subscribers who pay $.30 per 100-kWh block for clean electricity. "The early model turbines were relatively low-cost so wind power has been a good investment for us," said Al Tschepen, Minnkota's vice president for planning and system operations.

One big customer—the U.S. Air Force—drove the installation of the Infinity II near Petersburg, N.D., in 2002. Federal legislation requires the military to get a certain amount of power from renewable resources. That put the Grand Forks Air Force Base in the market for clean energy, so Minnkota was able to develop its second turbine. Retail power supplier Nodak Electric Cooperative sells the wind energy to the base and to green power program subscribers.

See WIND AWARD, page 4

Wind award *from page 3*

Knowing when to buy

In addition to providing consumers with an affordable green power option, developing the Infinity turbines provided Minnkota with an education in wind power that came in handy in 2007. Minnesota passed its renewable portfolio standard (RPS) that year, requiring utilities to get 25 percent of retail electricity sales from eligible renewable resources by 2025.

With just under 2 MW from its own units, Minnkota needed more renewable energy to comply with the RPS. "We knew from experience that installing it ourselves just wasn't going to be economical because Minnkota did not qualify for the production tax credit that is available to other organizations," said Tschepen.

Fortunately, Minnkota had established relationships in the wind industry that enabled the G&T to negotiate cost-effective power purchase agreements (PPAs). "NextEra Energy, which built our turbines as FPL, had been a good partner," said Tschepen. "They were very cooperative, and we knew we could count on timely, reliable delivery."

The relationship was so good that Minnkota ultimately signed four PPAs with the wind developer. The first, in 2007, was for 99 MW of capacity from the Langdon I Wind Farm in Langdon, N.D. Another contract followed in 2008 for 40.5 MW from NextEra's Langdon II facility.

Later the same year and in 2009, Minnkota purchased 148.5 MW from the Ashtabula wind farm near Valley City, the location of the G&T's first turbine. With its later purchase of 69 MW, again from Ashtabula, Minnkota's wind holdings reached 357 MW—more than 30 percent of its customers' energy requirements. "More than enough to satisfy Minnesota's RPS," Tschepen pointed out.

Purchasing, rather than owning wind energy, may have been the most cost-effective and efficient path to RPS compliance, but it wasn't all smooth sailing for Minnkota. The Langdon farms needed 35 miles of 115-kV line, while the Ashtabula projects required a 62-mile-long, 230-kV line to deliver the power to the intended markets. To build the necessary transmission, Minnkota teamed with investor-owned Otter Tail Power Company, which was also purchasing generation from the projects. "Whether a utility buys or builds wind, it's a team effort," stated Tschepen. "Minnkota's wind program has really benefitted from good partnerships."

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/apr/apr112.htm

Burbank *from page 2*

avoid about 1.3 million pounds of carbon dioxide annually.

On average, residents who participate in the Green Home House Call program reduce their annual energy and water bill by $129. If residents were to conduct these services on their own, the estimated average cost would be about $2,300. All of these savings represent much needed cash going back into consumers' pockets during difficult economic times.

While the program staff at Burbank Water and Power is thrilled with the recognition from CMUA, the results are the big reward. "It could not be for a better program," remarked BWP General Manager Ron Davis. "Green Home House Call is good for the resident, good for the utility, good for the entire community. It's a win-win all the way around."

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/apr/apr111.htm

Western, CEA sponsor IR camera workshop in North Dakota

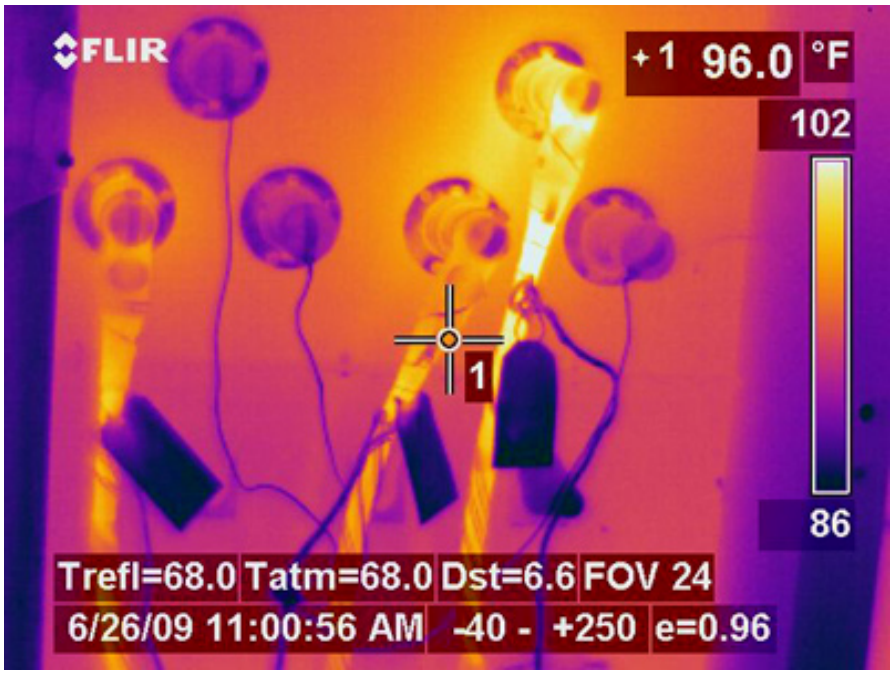
Because every tool works better when you know how to use it, Energy Services is teaming up with Clean Energy Ambassadors to present Infrared Thermography: Hands-On Training for Utility Systems and Customer Service Applications, April 13 and 14, in Grand Forks, N.D.

Packed agenda

It is no coincidence that the location of the workshop is on the University of North Dakota (UND) campus in Grand Forks, the focus of more than one Energy Services Bulletin story singing the praises of IR cameras. Darrel Iverson—UND electrician and workshop speaker—will talk about using regular IR inspections to help maintain the campus electrical system. Another speaker, Peter Olsen, Energy Services manager with Cedar Falls [Iowa] Utilities will tell how the city launched its own utility IR service program. Going beyond basic building audits, the program includes street-level drive-bys and IR flyovers.

Trainers from FLIR Systems and Fluke Thermography will meet attendees "where they're at" in terms of IR experience. Everyone, from the first-time user to the IR camera expert, will take home new skills. This is your chance to get answers to your questions about the equipment and its uses.

Most importantly, you'll receive hands-on training with a variety of camera makes and models. For a taste of "real-world" experience, the agenda even includes field trips. Iverson and Chad Reisenauer from Basin Electric Power Cooperative will take attendees on an IR tour of UND applications during the April 13 lunch break. Trainers will accompany attendees on an optional nighttime adventure to practice new skills on UND buildings.



Using an IR camera borrowed from the Equipment Loan Program, UND Electrician Darrel Iverson located this overheated transformer connection, which would have left students in the dark if it had not been found and repaired.

These activities may start attendees thinking about all the ways they could use an IR camera—if only they had one. Energy Services' own Gary Hoffmann will help out by telling Western customers how they can borrow IR cameras from the Equipment Loan Program.

You asked for it

If this workshop sounds like just the kind of training you need, that's because it was your idea. It started with a free lunchtime webinar Clean Energy Ambassadors (CEA) asked the Equipment Loan Program to cosponsor last December. Hoffmann agreed, noting, "The IR camera is probably our most popular loan item. The range of uses for this equipment is almost limitless."

"Infrared thermography is a great tool for fostering energy efficiency at community-owned utilities, which fits CEA's mission," said Jill Cliburn, a leader of the CEA program. "Even small utilities can use IR inspections as a way both to improve utility service and to build customer relationships."

The webinar was well attended, even though it was held right before Christmas. "Much to our surprise, we got a lot of participants and they had all sorts of questions about IR camera applications," Hoffmann recalled.

That outpouring of interest, especially in the Upper Great Plains Region, convinced Western and CEA that there was an audience for the next level of training. The agenda is based on the kinds of questions asked during the webinar. Participants will learn how to use IR cameras to

See IR CAMERA WORKSHOP, page 8

Technology Spotlight:

Ground-source variable refrigerant flow heat pumps—Affordable heatibg solution

(This article was excerpted from the Washington State University Energy Extension fact sheet, Ground-source variable refrigerant flow heat pumps: A solution for affordable housing, assisted living, hotels and dorms.)

The VRF heat pump system that was installed at Little Deschutes Lodge in La Pine, Ore., makes the affordable senior housing complex a nearly net-zero facility. (Artwork by Little Deschutes Lodge)

Ground-source heat pump (GSHP) systems that use variable refrigerant flow (VRF) are among the most efficient and cost-effective heating, ventilating and air conditioning (HVAC) systems available. By using ground water loops, multi-speed fans and variable speed compressors, ground-source VRF heat pump systems achieve savings over either GSHP or VRF alone.

GSHPs vs. air-to-air

A typical air-to-air heat pump, which exchanges heat with outside air to provide heating or cooling, loses efficiency as the outside air temperature deviates from ideal. To compensate for decreased performance in extreme conditions, air-to-air systems are often over-sized. If ambient conditions could be moderated, this over-sizing would not be necessary. One way to do this is to bury pipes underground, where the temperature is relatively constant year round.

GSHPs, also known as geothermal heat pumps, capitalize on this idea by tapping a large reservoir of nearly constant-temperature heat—the ground. Because heat is exchanged with the ground, not air, GSHPs remain a very efficient source of heating and cooling all year.

GSHPs typically use refrigerants to draw heat from or reject heat to water, which is the heat-exchange fluid. Water transfers heat much more efficiently than air, so GSHPs gain additional efficiency.

Benefits of VRF

VRF technology uses multi-speed fans and variable-speed compressors to enhance the efficiency of exchanging heat with water. VRF systems are gaining universal acceptance because:

- Outdoor heat exchanger units are connected to indoor units with small refrigerant piping. This requires less indoor space, resulting in more design flexibility and rentable space.
- Some units may be in heating mode when others are in cooling mode. This allows heat rejected from rooms that are being cooled to be used in rooms that are being heated.
- VRF systems minimize duct losses because most or all ductwork is eliminated. This may allow buildings to be designed with lower floor-to-floor heights, reducing construction costs.
- VRF systems use multi-speed indoor air handler fans, multi-speed outdoor condensing unit fans, variable speed compressors and linear expansion valves, features that all contribute to the high part-load efficiency.

Energy savings

To compare the energy use of various HVAC systems, an assisted living facility was modeled in various cities using Energy Pro building modeling software. Ground-source VRF heat pump systems were found to use, on average, 37 percent less energy than air-source heat pump systems.

Case study

The Little Deschutes Lodge, an affordable housing project for seniors in La Pine, Ore., has a ground-source VRF heat pump system and the facility is nearly net-zero energy. Over a 12-month period, the gas and electric bills in this 26-unit complex averaged out to about $37 per month, per apartment! The Lodge's energy use index (EUI) is only 29

See TECHNOLOGY SPOTLIGHT, page 8

Website of the month:

Montana Weatherization Training Center

You don't have to live in Montana or be a weatherization professional to appreciate the Montana Weatherization Training Center website—the resources here can help utilities educate their staff and customers alike.

WxTV offers an online library of videos that use field and laboratory demonstrations and interviews with contractors to explain weatherization measures in a user-friendly way.

Workforce training

Since 1991, the center has trained and certified specialists who weatherize homes every day. Montana's Human Resource Development Councils and tribal associates work closely with the center to teach safe, efficient, cutting-edge techniques for improving housing.

The curriculum covers such topics as air sealing, furnaces, doors and windows, lead-safe weatherization and insulation. To ensure that homes are healthy and safe as well as energy-efficient, EPA-certified classes on lead renovation are held throughout the year. Visitors can check the Training Calendar for course schedules.

While the EPA lead renovation courses are not specifically related to energy use, this section contains resources that homeowners—ratepayers—are likely to appreciate. Utilities can download the 11-page brochure, Renovate Right, to include with the information customers receive during an energy audit. In service territories where many homes were built before 1978, sharing information about lead abatement is good customer relations—and just being a good neighbor.

Consumer education

You don't have to be a professional or visit the center to benefit from its accessible approach to weatherization education, however. Starting on the home page, visitors will find an extensive menu of downloadable brochures on a variety of energy-saving topics. These consumer-friendly fact sheets would make great bill stuffers for explaining measures that utilities are promoting in their energy-efficiency programs.

The highlight of the website is WxTV, an online weekly video series that covers everything from basic consumer education to blower door tests to workforce development. These professional videos are generally 10 to 15 minutes long, although a recent post that visited weatherization training centers around the country ran 20 minutes.

Ben Cichowski, the center's instructional designer, hosts the videos which include field and laboratory demonstrations and interviews with weatherization professionals. Best of all, the crew takes "road trips" at visitors' suggestions to cover weatherization issues from other regional perspectives. There are episodes on attic insulation in North Dakota and Arizona and on weatherization in the Navajo Nation. A whole series is dedicated to the challenges of tightening up mobile homes.

Site design issues

As good as Montana Weatherization Training Center's resources are, visitors may have some difficulty finding them. The primary navigation is in a small font in the upper right side of the page at the bottom of the banner, and it is not present on the video library page at all.

Professional and consumer resources are located in a left navigation bar, but most visitors will have to scroll down to find the links, which are below the social networking links. The site offers plenty of ways to connect to the center through Facebook and Twitter, but direct contacts at the center are a little harder to find. Select About us to find a list center staff, along with contact information for each—a far cry from most sites where you can only e-mail a generic address.

While these site design issues can be bothersome, they don't prevent the website from being a go-to reference for questions about weatherization. That may sum up the spirit of the Montana Weatherization Training Center: the focus is all on weatherization, from hands-on skill training or consumer outreach.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/apr/apr115.htm

IR camera workshop *from page 5*

improve distribution system safety and efficiency, and to perform more effective home and business energy audits. Presentations will even cover the role IR cameras can play in local economic development.

The catch…

Unlike a webinar, a workshop is subject to brick-and-mortar limitations. To ensure that attendees have plenty of hands-on time with the cameras, enrollment is limited to 30. Meaning, don't wait, register today!

Participants in a two-day workshop have to be housed and fed. Don't worry too much about the feeding part, though—your $125 registration fee includes Day 1 lunch, Day 2 continental breakfasts and a few snack breaks. Lodging is available just a short walk from the campus at the Hilton Garden Inn Grand Forks-UND. Participants should make their reservations directly with the hotel, and request the special workshop rate of $89 per night.

Grand Forks is centrally located in the upper Midwest, so attendees should be able to drive to the workshop. Basin Electric has assisted in the planning, urging its customers to attend. Statewide organizations, such as the Iowa Association of Municipal Utilities, have also helped promote the program.

However, if you cannot attend this flagship event, pick up the phone or email your Energy Services representative and suggest a workshop a little closer to your home. If there is enough interest in your region, the infrared thermography workshop may be coming to a town near you soon.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/apr/apr113.htm

Technology Spotlight *from page 6*

kBtu/square foot/year, compared to about 70 kBtu/square foot/year for an average dorm unit as calculated using Energy Star's Portfolio Manager, making it more efficient than 95 percent of similar units. Installing a ground-source VRF heat pump system at Little Deschutes Lodge has saved the owners and residents a lot of money.

Conclusions

For affordable housing to be viable, operating and maintenance costs need to be as low as possible so property owners can hedge against rising costs for utilities, operation and maintenance. A highly energy-efficient HVAC system can go a long way toward helping to achieve these goals. Based on modeling of an assisted living facility using Energy Pro software, the ground-source VRF heat pump systems can reduce energy consumption for heating and cooling by 32 to 40 percent.

However, ground-source systems are invariably more expensive than air-source systems, so the engineer will need to do a cost-effectiveness analysis to determine if the extra cost can be justified. For comparison, air-source VRF installation costs about $14-18/square foot. Ground-source system installation costs approximately $30/square foot. Systems combining ground-source with VRF will cost slightly more to install.

Have additional questions? Contact Western's Energy Experts at 800-769-3756.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/apr/apr114.htm